

**Response to FCC ET Docket No. 03-104, Inquiry Regarding Carrier Current Systems,
including Broadband over Power Line Systems**

Please consider the following in response to questions asked by the Office of Engineering and Technology in the Notice of Inquiry regarding Broadband over Power Line Systems. My name is Gregory D. Lapin, I hold a Ph.D. degree in Electrical Engineering and am licensed as a Professional Engineer in the State of Illinois. I work as a consultant in the communications industry and serve as a member of the FCC OET Technological Advisory Council. As a licensed amateur radio operator for over 33 years I am well acquainted with the value that the Amateur Radio Service has for our society and the technical advancement to which it has always been a party. Any change in regulations that harms this valuable service would be a disservice to us all. After examining the technical aspects of some of the proposed implementations of Broadband over Power Lines, I believe that this technology would be incompatible with Amateur Radio and other services that use the HF spectrum.

Are the existing Part 15 rules for low speed carrier current systems adequate to protect authorized users of the spectrum who may be affected by the new high speed BPL technology? What changes to these rules, if any, are necessary to protect authorized radio services?

No. In the HF spectrum the current rules state that a carrier current system may radiate up to 30uV/m at a distance of 30 meters. While this may be marginally appropriate for carrier current devices that are limited to a single home, Access BPL will be carried throughout residential neighborhoods, putting its radiated signals in close proximity to many receivers whose operation depends on reception of much weaker signals. For example, a shortwave broadcast signal is typically received with signal strength of -120 dBW and the currently allowable Part 15 field strength from an Access BPL transmission would be as high as -85 dBW, thus totally obscuring the desired signal that would otherwise be perfectly receivable.

Part 15 limits on radiated emissions for a technology such as Access BPL that spreads its signal to radiators over a wide area must be far lower than currently permitted. The current presumption is that carrier current devices are isolated to small areas and this is marginally acceptable. If the signal is carried along wires over a wide area, the limits for radiated emissions must be lowered to account for the greater likelihood of harmful interference.

How should the Part 15 rules be tailored both to ensure protection against harmful interference to radio services and to avoid adversely impacting the development and deployment of this nascent technology?

Due to the potential wide geographical distribution and the disparity between levels of currently accepted emissions from carrier current systems and the much lower levels at which harmful interference to all HF and VHF reception occurs, the only answer to preventing harmful interference that I can envision is for Access BPL to avoid using all frequencies that may be in use for communications and broadcast reception.

Should the Part 15 rules specify both radiated emission limits and conducted emission limits for BPL systems, or would one type of limits be sufficient to control interference from both low speed and high speed BPL? Since all carrier current systems inject RF signals into the power line for communication purposes, would conducted emission limits be more appropriate to protect authorized radio services?

Radiated emissions are the mechanism of interference from Access BPL systems. The variety and complexity of power line configurations makes it difficult, if not impossible, to characterize or model the relationship between conducted and radiated emissions. Thus, measurement of radiated emissions from each specific Access BPL site will be necessary to insure adequate control of interference to authorized radio services.

How should measurement procedures for testing new BPL systems, both Access and In-House, be developed in order to promote consistency with measurements of existing carrier current systems and repeatability of test results?

Access BPL must be measured on site because of the wide variation of system configurations, particularly with respect to changing loads and impedances. Measurement should take into account the amount of noise signal that reaches expected receiver locations. The long wavelengths of the emitted signals make it necessary that measurement take place at an adequate distance from the power lines so that nonlinear near field effects do not obscure the reliability of the measurements. The system throughput should be loaded to capacity in order to derive the maximum signal emission.